April-May 1970

EMO

National Civil Emergency Measures
Civil Emergency Planning
House of Commons Debates
Civil Defence Operational Developments
Life in Shelters — Sweden
In the Shadow of Ground Zero
Emergency Management — Survive

CANADA EMERGENCY MEASURES ORGANIZATION

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Editor: A. M. STRTON

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NATIONAL CIVIL EMERGENCY MEASURES PROGRAM

by
J. F. Wallace

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Canada Emergency Measures Organization

The following is the text of an address delivered to the Mayors—Elected Officials Conference (French) in February 1970 at the Canadian Emergency Measures College, Arnprior, Ontario.

I am pleased to have the opportunity to speak to you this morning about the "National Civil Emergency Measures Program".

You heard Mr. Patterson speak about the broad subject of civil emergency measures. As well, Mr. White spoke to you about "The Threat" (Digest—Dec. 1969-Jan. 1970). At the present time this threat is not imminent because there seems to be a certain detente, growing from day to day, between what we call the EAST and the WEST, and a desire not to start a world war. Consequently, we have a situation in which the threat is real, but the risk of an actual attack, at this time, is very small or very limited. Nevertheless, the only likely threat is a nuclear attack. Because of logistical problems, we do not believe that the launching of chemical or biological rockets is possible.

If our country is attacked, there will be a very large number of victims and a great deal of damage—on an unprecedented scale. Therefore, we must develop programs that will lessen the number of victims and limit the amount of damage.

In order to get an idea of the whole problem, we asked the Defense Research Board, two years ago, to prepare a simulated situation which would show us a realistic incident, an incident which the Russians are capable of producing.

These are the results of this study:

Killed	8,500,000
Seriously injured	790,000
Slightly injured	770,000
Uninjured survivors	11,910,000
Total	21,970,000

I would like to draw your attention to a few main points:

1. This attack was directed against 17 cities on which bombs with a force of 236 megatons were dropped.
2. 54% of the people were not injured.
3. The damage was unprecedented.
4. The study was done without considering emergency measures, such as warning or shelters; in other words, the attack was unprepared for.

Our problem, therefore, will be to find a way to reduce the number of victims and the amount of damage.

During this conference, you will hear other speakers who will explain various courses of action. My task, if you like, will be to explain the measures that must be taken in the whole planning program. I am going to describe, therefore, the national programs and their key elements which will contribute to the fulfilment of the national objective, and I shall explain, when necessary, the progress that has been made, what remains to be done, and where the deficiencies are.

But, first of all, what is our national objective?

> "The national objective of civil emergency measures planning is to develop in peace time, civil plans and preparations designed to enable the nation to survive and recover from any war emergency and which, together with military defence measures, represent the total national defence posture of Canada."

Briefly, what we propose is:

First—to work out plans to help protect and safeguard life and property. In other words, it is a question of measures that will help the people to survive.

Secondly—to set up and maintain a government structure to enable all government machinery which is vital in an emergency, to continue to furnish directives, and to direct the essential services entrusted to its care.

Thirdly—to protect resources, thanks to measures which would insure a systematic administration of all the reclaimed resources in such a way as to facilitate an economic recovery.

These general goals are the basis for emergency planning. To organise our planning, we have chosen seven areas which are now included in the national program.

These areas are:

1. Public protection.
2. Public information.

3. Essential societal services.
4. Continuity of government.
5. Public utility services.
6. Resource control.
7. Service activities.

Moreover, these areas or divisions are further subdivided into forty activities. Most of these activities, that is to say twenty-one of them, are concerned with the organisation of emergency measures. Thirty-three of the forty activities require the participation of the provinces. Naturally, I am going to direct your attention to the activities for which my Organisation has the most responsibility.

Public Protection

The *first division* is Public Protection. The principal measures are:

1. Dispersal of people from target cities.
2. Nuclear defence measures.
3. Shelters.
4. Protection of individuals.

If carried out, these measures will result in the saving of lives which would otherwise be lost. Please note that these measures are directed against the effects of nuclear explosions, such as radioactive fallout, blast and heat.

Shelters

Although we do not have what one could call a well defined policy on shelters in Canada, we are striving to develop one. We have drawn up an inventory of protection facilities in public buildings across the country, to determine the type of protection that would be available, if ever the people had to take cover from an attack. The survey showed that there are about 50,000,000 places suitable as fallout shelters. However, many of them are not situated where the citizens need them, although there is a great number of shelters in the centres of target cities. For example, in Quebec, the results show that there are more places with a protection factor greater than ten than there are people in the province. But if one leaves out of account all such places in Montreal, one finds there is a shortage of space. The objective, then, is to have places of protection for everyone who could be affected by radioactive fallout.

Dispersal

Although one cannot guarantee that we will know when the enemy attacks, we are trying to encourage the authorities of large cities to have plans prepared for the dispersal of the people. In addition, the authorities outside these cities must make plans to receive these people. Six out of seventeen cities now have such plans.

Nuclear Defence

Our study of the threat shows and confirms that one of the most serious problems will be radioactive fallout. Over the last five years, we have helped the provinces to detect radioactive fallout by supplying more than fifty thousand detectors. This activity is continuing.

Protection of Individuals

This activity is concerned with the measures that individuals and families must take, which will help protect them against the hazards of war. Furthermore, we know that these measures will give them confidence during the period after the attack.

Some of the measures are:

- Fundamentals of first-aid and nursing care at home.
- Fire prevention.
- Possession of a battery-operated radio.
- Emergency provisions.
- Information about cleanliness in times of emergency.
- Knowledge of the effects of nuclear explosions and special courses of action against these effects.

The objective is to have every household in the country prepared.

Public Information

There are three parts to this program:

- Public news service in peacetime.
- Public news service in an emergency.
- Warning.

This second division is connected very closely with the division or program for public protection. Here, we are trying to give the public, emergency instructions and directives through the showing of films and television film clippings, radio announcements and various publications and brochures. We have a series of pamphlets for families and individuals. However, to be effective in this field, we must assist the provinces and municipalities which are, after all, the authorities closest to the people.

In the case of information in an emergency our objective is to develop the ability to transmit essential news to the public during a period of emergency. In a sense, we will use the information we used in peacetime, but transmitted by an emergency broadcasting system and by other means of communication which would remain intact after the attack. Every government centre must have an emergency news service to develop these aspects fully.

Warning

The third activity, which is very important in this division, is to establish and operate an alert system which would warn the public. As some of you know, the alert is first given at NORAD headquarters; it is then sent to the federal alert centre, and is finally diffused to the various provincial alert centres. Sirens can then be used to warn the people that an attack on the areas and places designated as likely targets is expected.

As I said before, we have a radio broadcasting system which can transmit instructions to the public. This Emergency Broadcasting System is expected to use all the existing radio and television installations in Canada. In my opinion, this constitutes one of the key factors in survival plans, because it enables the governments to inform the public what it must do to insure its own survival. This is a total of 351 radio and television stations in this system.

Essential Societal Services

In the third program we are concerned with the following essential societal services:

- Health Services
- Welfare Services
- Education Systems.

The objective is to have plans and arrangements to insure the continuation of societal services. In addition to these services, we expect to make arrangements for the victims of an attack.

Health

Since 1952 the Federal Emergency Health Organization has accumulated medical supplies and material to the value of twenty-one million dollars in various locations in Canada. All the material and supplies are packaged in operational units and arrangements have been made to turn these supplies over to various authorized provincial organizations.

In co-operation with provincial authorities, the Health Services is responsible for the organization of the following:

- Emergency hospitals.
- First treatment centres.
- Assembly points for the injured.
- Public hygiene mobile laboratories.
- Additional plasma reserves.
- Emergency clinics.

This program puts us in a position to care for the injured following a nuclear war. Of course, we will be the first to admit that this would not be sufficient to look after all needs. This is why we insist on the importance of the Public Protection and Public Information programs, or in other words, the measures to be taken to reduce the number of victims.

Welfare

In the area of Welfare, we want to elaborate on the courses of action which will enable us to supply emergency welfare services. In this case, the objective is to set up across the country, welfare centres which can supply clothing, lodging and food, and registration, information and personal services. We recommend that every community which is not a likely target should organize these centres.

The federal department also has a reserve supply of clothes sufficient for two hundred and fifty thousand people. Furthermore, there are one hundred and thirty-seven emergency food units, and one hundred and seventy supply units to help set up welfare centres.

Education

In the area of education, we must have authority from the Ministers of Education to make plans to reduce the destructive effects of a war on the education systems, and to take measures to insure the continuation of the educational process. This area is really one of the provincial responsibilities.

Religion

Although it is not made clear in our program, one of the provinces included religious affairs as an essential societal service.

Continuity of Government

One of the most important divisions is the continuity of government in case of a nuclear war.

The most important aspects are:

- Protected installations.
- Trained key personnel.
- International relations.

The objective of this program is to protect the political leadership and the structure of the government so that every government in the country will be able to carry on during an emergency through the control of essential services.

Protected installations

It is in this field that we have made very significant progress. On the central government level, we have a group of shelters, or a complex of protected installations, situated outside the Ottawa area. It is here that government leaders, elected or otherwise, would go to maintain continuity of the central government.

On a lower level, we have, as well as the central installations which have been provided, six emergency regional government centres, situated at Valcartier, Shilo, Camp Borden, Debert, Penhold and Nanaimo. The present program aims at finishing four other centres, for the provinces of Prince Edward Island, Saskatchewan, New Brunswick and Newfoundland. Interim plans have been made for these provinces. All of these centres must be linked together by emergency communication systems; these systems, may I add, already exist. The emergency centres have been provided with all the necessary equipment, and in this way, they can be put into operation as soon as the designated people arrive.

In the same way, we are in the process of setting up a group of zone headquarters which represent for a province, a control level between the provincial government and the municipalities. We have eleven such headquarters now and altogether, we need thirty-four.

On an even lower level, but in my opinion, the most important one, 400 emergency municipal government centres are necessary across Canada. About 120

municipal centres already exist. They are also equipped with intercommunication systems.

Key personnel

In one sense, we can say that we have perfected the main machinery which will enable governments to carry on in an emergency. In most cases, the key personnel who are assigned to these places, whether on the federal, provincial, zone or municipal levels, have received instructions and know, certainly on the federal level, where they must go in an emergency. In this area, I include plans for mobilization, orders and regulations which have been prepared, essential documents placed in reserve and uniform operational methods for each operations centre.

International relations

This division also includes the preparation of policy and international civil emergency plans and the exchange of information leading to the co-ordination of the civil emergency measures of Canada, the provinces and the United States, and of Canada and NATO in specific areas, and to the negotiation of corresponding international agreements. We are co-operating, for example, in the areas of provisioning, oil and petroleum products, civil aviation and maritime affairs. With the United States we are co-operating, among other things, on questions of telecommunications, warning and compatibility of operational plans on the province-state level.

Special and Public Utility Services

In our planning, the fifth division is concerned with arrangements for public services, such as fire, rescue and utility services.

Fire service

For fire service, we want to be able to reduce fire vulnerability, and each municipality should have a plan of action for emergencies, with the present fire services strengthened by auxiliary firemen. Surely, the most important measure is to have someone trained to detect and fight fires in every home.

It is very clear that our objective has to be the development of the ability to prevent fires as well as the ability to carry out co-ordinated fire-fighting operations.

Rescue service

Although we realize that it would be extremely difficult to carry out rescue operations in an area damaged by a nuclear explosion, it is still necessary to set up a rescue service to conduct organized rescue operations. Therefore, each part of the emergency government needs a plan for the organization, co-ordination and conduct of rescue operations. Such services can be useful even in peacetime disasters.

Public utility service

The third service concerns public utilities. The objective here is to develop the ability to keep essential services such as water, gas, hydro and sewer in working order. We also hope that the public utility services will make plans to protect vulnerable installations.

Economic Planning and Resource Control

I want to talk to you about the sixth division, which is economic planning and resource control. There are sixteen elements included in this division. I shall describe them to you in general terms.

In this field, it is necessary to make plans and preparations for economic planning and resource control in order to supply the people with enough food and water to enable them to live and work productively, and as well, to meet the demands of overall defence and keep the national economy in a viable state.

Here, most of the work has been assumed by the responsible department and co-ordinated as required by the Emergency Measures Organization. Emergency plans to protect the productivity of agriculture and fisheries, and the operation of essential industries, are all ready, and are being constantly brought up to date.

Work is going on continuously in planning, emergency manpower resources, lodging regulation, and engineering and construction material services.

Although most of the work in these areas is directed by the federal government, it would have obviously not been possible to accomplish what has been done to the present time without the whole-hearted support and co-operation of the provincial departments involved and certain business and industrial leaders.

Service Activities

The last group of activities consists of services which were difficult to classify because they are designed to support nearly all the other activities. They are called "Service activities":

- Telecommunications
- Damage assessment
- Law and order (the police)
- Postal service
- Provincial administration and control
- Transport
- Vulnerability analysis.

Each of these activities, in itself, is very important. For example, without a system or network of telecommunications, the various levels of government would not be able to communicate with one another. Who among us to-day can deny the need for policemen during an emergency to keep law and order? I am sure, as well, that we can all see the importance of having plans for the management of ways of controlling and directing the civil resources of transport services.

Gentlemen, we have seen the types of emergency measures that exist to-day, but which, for the most part, did not exist ten years ago. It is true that although the planning was not impressive in the past, much has been

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CIVIL EMERGENCY PLANNING

Canada Emergency Measures Organization

As a result of organizational and administration studies (including Project Phoenix 1968), federal-provincial discussions and conferences, and transferrance of the Canada Emergency Measures Organization to the Department of National Defence some changes of establishment and functions have evolved. The following resume has been prepared by the Public Information Planning Division as a reference paper to supplement Order-in-Council PC 1965-1041 as amended by the 1968 P.C. Orders noted in the text.

The Emergency Measures Organization was established within the Privy Council Office on June 1, 1957, for the purpose of planning for the provision of government leadership, services and resource management in an emergency, and to ensure a Canadian contribution to NATO civil emergency planning.

On May 28, 1959, a Canadian federal government order placed the Emergency Measures Organization under the Prime Minister and defined the civil defence responsibilities of National Defence, National Health and Welfare and Justice Departments. Under this order, the Emergency Measures Organization assumed, in addition to its government and resource management planning, the responsibilities of the Civil Defence Branch which, in turn, ceased to exist.

Order-in-Council P.C. 1963-993 of June 27, 1963, transferred responsibility for the Emergency Measures Organization, to the Minister of Defence Production. Two years later Order-in-Council P.C. 1965-1041 approved the Civil Emergency Measures Planning Order which in addition to defining the responsibilities of various federal departments and agencies, placed the organization under the Minister of Industry.

The 1965 Order-in-Council was amended in 1968 by P.C. Orders 1968-1302 and 1968-1508 which transferred responsibility for civil emergency planning from the Minister of Industry to the Minister of National Defence. Under the Minister, the Canada Emergency Measures Organization is the federal co-ordinating agency for all civil emergency planning.

Canada EMO functions include:

(1) develop policies and a program to ensure the continuity of government in an emergency;
(2) co-ordinate civil emergency planning and training by departments, agencies and Crown corporations of the Government of Canada;
(3) in conjunction with provincial authorities, develop policies and a program for the control of civil road transport resources in an emergency;
(4) plan civil emergency measures in respect of matters that are not the responsibility of any department, agency or Crown corporation of the Government of Canada, or recommend to the Governor in Council the assignment of such responsibility to a minister;
(5) provide assistance and guidance to provincial governments and municipalities in respect to the preparation of civil emergency measures in matters that are not the responsibility of any department, agency or Crown corporation of the Government of Canada;
(6) with the concurrence of the Secretary of State for External Affairs, provide general liaison with other countries and with the North Atlantic Treaty Organization on matters relating to civil emergency measures;
(7) be responsible for the direction and administration of the Canadian Emergency Measures College, at Arnprior, Ontario.

The Civil Emergency Measures Planning Order also defines the civil emergency powers, duties and functions of the ministers of federal departments and agencies having immediate responsibilities in the event of a war emergency. Included in this category are the Departments of Agriculture, Supplies and Services, External Affairs, Finance, Fisheries, Justice, Labour, Manpower and Immigration, National Defence, National Health and Welfare, Post Office, Public Works, Solicitor General, Transport; and the Bank of Canada, the Canadian Broadcasting Corporation, the Central Mortgage and Housing Corporation and the Royal Canadian Mounted Police.

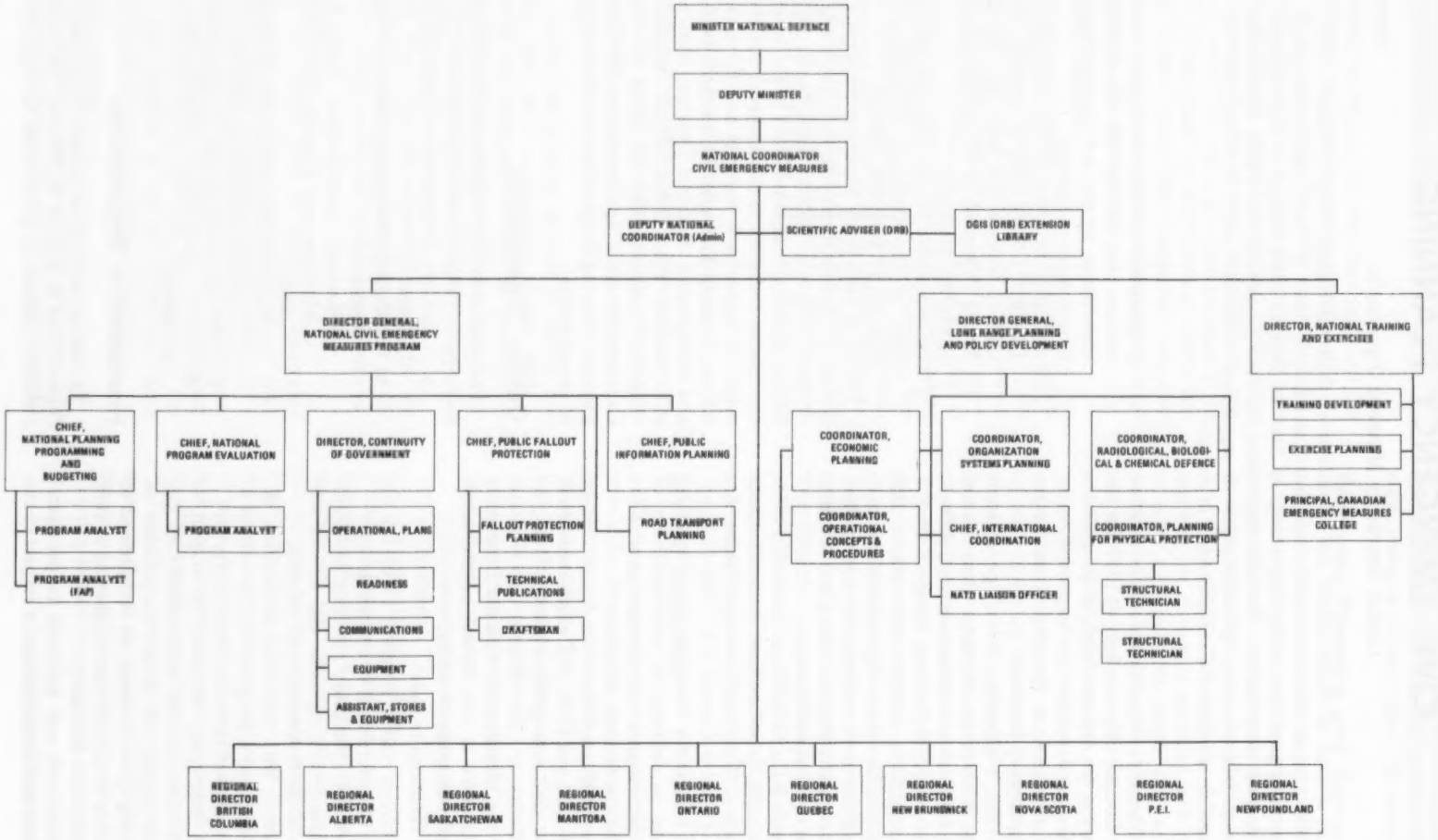
Outline Organization

The general federal organization for civil emergency planning may be summarized as follows:

a. A Cabinet Committee on External Policy and Defence;
b. The Canada Emergency Measures Organization comprised of:
   (1) National Coordinator, Civil Emergency Measures and Canada EMO headquarters staff;
   (2) Regional Directors in each Province;
   (3) Canadian Emergency Measures College;
c. Federal government departmental planning staffs;
d. Federal government organizations in the provinces.

Headquarters Organization

The headquarters of the Canada Emergency Measures Organization is located in Ottawa. The National Co-ordinator reports to government through the Minister



CANADA EMO ORGANIZATION CHART

of National Defence. A regional office is located in the capital city of each province and for planning purposes each region corresponds to its respective provincial boundaries. Planning responsibility for the Yukon and the District of Mackenzie and Western Arctic Islands of the Northwest Territories is carried out from offices in Edmonton, Alberta.

Canada EMO has been organized into three major functional branches:

- National Survival and Recovery Program Branch
- Long Range Planning and Policy Development Branch
- National Training and Exercises Branch.

Within the National Survival and Recovery Program Branch are divisions responsible for planning and budgeting, program evaluation, continuity of government planning, public fallout protection planning, emergency public information planning, and road transport planning.

The Long Range Planning and Policy Development Branch is comprised of divisions responsible for economic planning, operational concepts and procedures, physical protection planning, radiological biological and chemical defence planning, organization system planning and international civil emergency planning.

The National Training and Exercise Branch is responsible for training development, national exercise planning and supervision of the Canadian Emergency Measures College.

Federal Regional Directors in Provinces

Regional Directors of Canada Emergency Measures Organization in each province (region) have been assigned the following responsibilities:

a. to represent Canada EMO in the region for all civil emergency planning purposes;
b. to establish and maintain effective liaison with the provincial government in the region; to assist in the development of provincial emergency plans, including those of local organizations, and to assist in the Canada EMO review of requests for financial aid from the province or municipalities within the region.

Provincial Goverment Civil Emergency Responsibilities

Provincial governments will make such preparations as are required to enable them to execute the following civil emergency powers, duties and functions in war:

a. the development of policies and a program to ensure the continuity of provincial government in an emergency. Included will be:
   (1) the selection of government departments and agencies with immediate responsibilities in the saving of lives and the continuing function of essential services and the development of plans by the departments selected covering their emergency operations;
   (2) plans for the relocation of government;
   (3) the designation of officials for duty in an emergency;
   (4) plans for the manning of Regional Emergency Government Headquarters, Emergency Government Relocation Units and Zone Emergency Government Headquarters;
   (5) the selection and storage of essential records;
b. the preservation of law and order, including control of traffic;
c. the organization and control of emergency welfare services including emergency clothing, lodging, feeding, registration and enquiry, and personal services;
d. the organization and control of health and medical services, including hospitals and public health measures;
e. maintenance and repair of roads and road bridges;
f. co-ordination of municipal and other services for the maintenance and repair of water and sewage systems;
g. organization and operation of firefighting services;
h. maintenance and repair of electrical and gas utilities;
i. organization and operation of radiological defence services;
j. communications as required from REGHQ to provincial government agencies and municipalities;
k. co-ordination and, as may be required, direction of emergency operations of municipal governments;
l. the conduct of survival operations with the assistance of the Canadian Forces, if required and available;
m. in accordance with agreements reached with the federal departments and agencies concerned
   (1) control of accommodation, control of engineering and construction resources, provision of emergency housing and arrangements for roads and road bridges;
   (2) control of road transport resources;
   (3) maintenance of agriculture production and the control of fisheries;
n. such other emergency functions as may be subsequently agreed between the federal and provincial governments.

In addition, provincial governments in peacetime will be responsible for:

a. assigning to each municipal government its operational roles;
b. providing assistance and guidance to municipal governments in respect of the preparation of municipal civil emergency plans for the continued operations of municipal government, survival of the public and the operation of municipal emergency services, including the organization and operation of such special emer-

gency services as may be required, such as rescue, warden, emergency communications, emergency public information, radiological defence and emergency transportation;

c. assistance and guidance to municipal governments in the training and exercising of regular municipal employees and volunteers as emergency workers;

d. making such preparations or arrangements as are required to provide for the protection of the population of those parts of the province which are not administered by an incorporated municipal government.▲

NATIONAL *(continued from page 4)*

accomplished in the last ten years, and the various arrangements which have been perfected constitute very significant progress. There is still much to be done, but in my opinion, progress, however small it may be, is nevertheless progress. However, it is essential that those who are involved in planning use their resources in such a way that there will be no waste.

I am convinced that by making certain preparations, we can prevent the effects of disasters of all kinds, be they fires, floods or armed attacks.

There is one other thing we must remember. If a world war broke out and the United States was attacked with nuclear bombs, but this country was not, we could experience hundreds of thousands of fallout victims. Consequently, emergency measures or civil protection are necessitated by events which are beyond our control.

There is still, perhaps, a great requirement for planning across the country on the municipal level, more than on other levels of government. I do not say that as a reprimand to those who are here, but rather to let you know that when we speak of survival in time of nuclear attack, we speak of the survival of municipalities. In fact, we are not talking about the federal government or the provincial governments, because it is on the municipal level that the people are to be found. Consequently, the key to survival, regardless of what the federal government may have tried to do, or may have done, will be what happens at the municipal level. This is why I think that more initiative, if I may use the word, should be taken by municipal authorities in the preparation of constructive plans and programs which need not depend, necessarily, on specific instructions from the so-called higher levels of government.

In conclusion, I would like to stress a few main points:

- There is a threat now.
- Civil organizations are needed to reduce the severity of an attack on our people.
- We have a national program which covers:
  a. the ten provinces
  b. three hundred emergency measures organizations representing more than ninety per cent of the people.
  c. forty-one activities
- In an emergency, the whole country will be affected.
- Everything, in terms of money, costs the country some fourteen million dollars a year.

In short, we have a program which is a kind of insurance whose premiums in terms of dollars are infinitesimal, in comparison to the loss of life and material damage this country might sustain by doing nothing.

I would like to conclude my talk with a few words from the late Governor-General, Georges P. Vanier, who said, eight years ago, concerning civil defence:

> "I do not want to predict that the exercise will become reality but such may happen. It is our duty to use every possible means, as individuals and as a nation, to prepare for such a calamity. But if, God forbid, it does happen, we must be ready to brave it, not only with resignation, but also with a steadfast determination to fight and conquer, however alarming or however unique the situation may be in the annals of history. We must face this prospect, not with fear, but without apprehension, not by accepting it passively, but by fighting it strenuously."▲

HOUSE OF COMMONS DEBATES

Extract from Vol. 114, No. 78, of the 2nd Session, 28th Parliament, dated March 3rd, 1970.

Mr. S. Perry Ryan Lib. (Spadina): Mr. Speaker, the Canadian public is informed that inventories have been taken of all potential public fallout shelters in our cities. The best locations are said to be in the basements of skyscrapers, public buildings and schools. Beyond inspection of these sites, apparently nothing has been done.

At this moment in time the threat to our cities from intercontinental ballistic missiles and submarine launched ballistic missiles is increasing, and although Canada has been engaged in civil emergency measure activities for over 20 years we do not have our public fallout shelters, let alone our private ones, properly prepared and stocked with supplies including canned foods, medical and sanitation supplies and radiological instruments. Worst of all, they are not marked as public fallout shelters. Thus, in an emergency the man on the street in Toronto or any other Canadian city would not know where to go or what to do.

Canada's fallout shelters survey of large buildings was tardily completed in 1968 and the results have only recently been distributed to the provinces. Priority was given to protecting emergency government sites for six of the ten provinces. It is announced Canadian policy to make no new expenditures for stock-piles of materials; there is said to be sufficient readily available from the existing resources in time of emergency. But where are they, and how will they be delivered to the fallout shelters when the warning time may be 15 minutes or less?

Mr. Speaker, time cannot be bought in an emergency, and our vulnerability can be reduced at low cost if we are prepared. The United States is prepared. It has a nationwide fallout shelter system using both public and private available resources. They have about 195,000 public structures that will provide shelter space for 187 million people. Private owners of almost 109,000 buildings have volunteered space for more than 104 million people and have authorized the placement of the black and yellow fallout signs on their buildings to mark them for use as public fallout shelters in event of attack.

In the midst of the more likely target areas, 95,000 buildings capable of sheltering 94 million people have been stocked with necessary austere supplies provided by the federal government. In addition, national surveys have been made of smaller buildings and private homes. More than 100,000 public shelter facilities have been equipped with radiological detection and monitoring instruments. There are more than 67,000 monitoring locations with instruments and personnel established, primarily at fire and police stations.

I have had the first-hand opportunity to see and hear about the preparedness of the emergency authorities and their fallout shelters in neutral Switzerland and Sweden and other countries in western Europe. I know that they are, like the United States, far better prepared for a nuclear attack than is Canada.

In our External Affairs and National Defence Committee we were told by two witnesses, Dr. Raymond Gastil and Mr. Robert Krupka, from the Hudson Institute in the United States, that millions of lives could be saved and countless injuries to individuals prevented by preparedness against nuclear attack. In protection you get what you pay for, they said.

Many think that we are in the most perilous position of any country in the world at this time, because Canada's geography puts us in no man's land on the direct intercontinental ballistic route between Russia and China in Asia, and the United States, and our population is at the interface of interception. Although we have good warning systems on land, in the sea and in the air, we are starkly and utterly naked in our active and passive defences against the very real threats of ICBMs and submarine-launched missiles. It must be realized that every city in Canada, with the possible exception of Winnipeg, can now be struck by nuclear missiles fired by Soviet submarines from either our east or west coast. Against these threats we have neither sword nor shield.

The construction of the Safeguard ABM system south of the border will give us some protection in that some incoming missiles will be destroyed over southern Canada and above the atmosphere by Spartan missiles. Others penetrating the Spartan umbrella will, in theory, be shot down within 25 miles or so of their target in the United States by the Sprint ABMs. However, although the nuclear explosions caused by the Spartans over our heads in Canada will cause very little blast or fallout radiation damage, they will blind millions of Canadians from glare if they are not protected from it. Anyone looking at such an explosion, or happening to be looking at a surface or object that reflects a sufficient amount of the glare, will lose his eyesight. The extension of the Safeguard system, therefore, increases this risk for Canadians and our need for fallout shelters.

Explosions resulting from Sprint contacts with incoming missiles in the atmosphere short distances across our border from the proposed Michigan, Ohio and New England ABM sites will, on the other hand, contaminate great areas of the southern halves of the provinces of Ontario and Quebec, and much of the Maritimes, with radiation, the degree depending upon the direction of the wind. It is urgently important, to

ensure against blindness and radiation effects, that Canadians within at least 400 miles of the United States border have properly prepared and marked fallout shelters to go to immediately, if and when the warning sirens sound.

It now appears that the plans of the Emergency Measures Organization have been blocked at the halfway mark, and if we were attacked tomorrow the millions of dollars already spent would serve little or no purpose except perhaps to provide evidence to those who might survive of government's prodigal spending of public funds. What this government needs to do, Mr. Speaker, is take a good look at the Boy Scout motto—Be Prepared.

Mr. D. W. Groos (Parliamentary Secretary to Minister of National Defence): Mr. Speaker, first of all, along with the hon. member for Spedina (Mr. Ryan) I should like to correct an impression which seems to be prevalent, namely, that there is extreme danger as a result of the explosion of defensive weapons These are designed to burst at such a height that they do not constitute a danger. Furthermore, it is not expected that the intercepted enemy weapon would itself explode. Even if it did, the extreme height of the explosion would reduce any possible damage to small proportions.

Mr. Ryan: Except through glare.

Mr. Groos: It should be added, also, that there is no significant radioactive hazard resulting from such high altitude bursts. Thus, one would not tie in fallout shelters with the question posed by the hon. member for Spadina with respect to explosions involving the Safeguard antiballistic missile system. Fallout shelters are designed to deal with the problem of nuclear weapons actually evading the defence system and bursting at or near ground level, thus creating widespread radioactive fallout.

As was stated at the recent Federal-Provincial Ministerial Conference on Civil Emergency Measures, the government of Canada authorized the Canada Emergency Measures Organization to carry out a fallout shelter survey of large buildings across Canada. This survey has been completed and the information is now being processed. I can tell the hon. member that the minister has asked to be provided with full advice concerning the analysis of the results of this survey as soon as possible. Until such time as he has had an opportunity to study them, he will not be in a position to advise the government with respect to the actions which might be taken in connection with community shelter plans, shelter marking and related matters to which my hon. friend referred, but these questions will be gone into.▲

Hon. Remi Paul, Quebec Minister of Justice and minister responsible for civil protection recently opened a new Zone 6 headquarters for Protection Civile du Quebec in the City Hall of St. Antoine-de-la-Riviere-du-Loup, County of Maskinonge. Officials taking part in the ribbon-cutting ceremony are (left to right): H. Jean Bernatchez, Regional Director (Quebec); Hon. Remi Paul; Canon Bernard Ferland of Louiseville; J. Norbert Labbe, Director General Civil Protection; A. Augers, Assistant Director General Civil Protection; and Mayor P. E. Caron of St. Antoine-de-la-Riviere-du-Loup.

CIVIL DEFENCE OPERATIONAL DEVELOPMENTS

The following address was delivered to the Society of Industrial Civil Defence Officers at its annual conference in London, England, 13 November, 1969 by Mr. J. L. Jones of the Home Office. It is reprinted from the Industrial Civil Defence Review, Vol. 17, No. 4, dated October-December 1969.

Introduction

I am glad to have this opportunity to address you collectively on developments in civil defence. At your last annual conference Mr. Howard outlined the implications of the Government's decision of January 1968 to place civil defence on a care and maintenance basis. For some time after that decision I was very largely occupied both in dealing with the Parliamentary Debates to which the decision gave rise and the work arising from the disbandment of the Civil Defence Corps and the Auxiliary Fire Service and the consequentials such as disposal of surplus equipment, payments of compensation for loss of office and matters of this kind. However, even from the start we were also concerned with the future development of civil defence on the new basis and now that the re-organisation is virtually completed we have been able over the past year to pay increasing attention to the development of future policy.

Care and Maintenance Policy

I don't suppose you will wish me to go over again the details of the reasons underlying the Government's present policy of care and maintenance and the consequences stemming from it, but since most of us do not continually carry in our minds the definitions laid down by Ministers it might perhaps be useful if I reminded you of what this policy is. You will find it defined from the industrial point of view in paragraph 8 of Civil Defence Industrial Bulletin No. 5. These are, first, that we wish to maintain knowledge and expertise on civil defence matters by keeping up to date a number of instructors and scientific intelligence officers, so that if the need arose we could restart training without the inevitable time lag which would result from instructor training. Secondly, we wish to maintain a general knowledge of civil defence at management level within Government departments, in local government and so far as possible in other fields including industry. Thirdly, we are maintaining and asking other organisations to maintain, operational plans for war, that is, plans to minimise casualties and other effects of a nuclear attack on production or services. Lastly, physical aspects of a specialised nature acquired for civil defence purposes and which are of operational value are in general being maintained; for example, we are retaining the buildings and communications for maintenance of government in war and a good deal of specialised equipment acquired for various other purposes.

Training of Instructors and Scientific Intelligence Officers

Our main resource for the maintenance of knowledge and expertise is the civil defence training establishment at Easingwold near York, with which some of you are probably familiar. This has a capacity of about 60 people, and this is of course a good deal less than we used to have. We run a wide range of planning and instructional courses here, not only for members of local authorities but also for other organisations such as the Warning and Monitoring Organisation, the Police, Water Engineers, Medical Officers of Health, the nationalised industries.

The keeping of instructors up-to-date is, of course a somewhat difficult process in the sense that the instructors themselves do not in general get an opportunity to pass on their extra knowledge. To that extent therefore the process may sometimes seem disheartening but I think that it does not take much reflection to see that if the need should ever arise to raise the level of civil defence preparations, the existence of even a comparatively small number of instructors could be of inestimable value.

I might say a word about the scientific field, since this is a vital element in any civil defence preparations. The foundation of the scientific organisation is the Regional Scientific Advisers, who are distinguished scientists, mostly scientific professors who provide on a scientific basis problems relating to a nuclear war and also help in the organisation and training of scientific teams. These teams are intended to help in the training of scientific intelligence officers and also for a wartime role in relation to the meaning of regional government in war. Although our limited training facilities have forced us to reduce to some extent the number of scientific intelligence officers allocated to local authorities and industry, the local authorities are keeping in training one scientific intelligence officer for each control, and these are given periodic refresher courses as Easingwold. We have also been discussing with Regional Scientific Advisers the holding of periodic regional meetings of local authorities and industrial S.I.Os. at which information can be exchanged.

The maintenance of a general knowledge of civil defence at management level is also a matter to which

we attach importance, and here our main resource is the Senior Officers Course at Easingwold. We are running approximately ten of these each year, that is to say one a month if one excludes the summer holiday period. I think these are quite successful.

Operational Planning

I should now like to turn to operational planning, but as this is a big subject I must necessarily pick on the aspects which I think are of particular interest to you and which are comparatively easy to describe.

Due Functioning

One aspect which I think will be of particular interest to you is that which we usually refer to as due functioning, that is, plans to enable production or services to continue during an attack or be re-started as soon as possible afterwards. You will remember this is mentioned in paragraph 8 (c) of Civil Defence Industrial Bulletin No. 5. Quite a lot has been done in the public sector to this end, and although you will understand that for the most part I cannot speak on these plans as an expert—for this one would have to look to the Ministries directly concerned, e.g. Technology or Transport or to the industries themselves—I think it would be worthwhile for me to refer briefly to them. The main elements are as follows. First, the essential services have arrangements for maintaining liaison with local authorities and regional controls, both to inform them of deficiencies and failures and to obtain help in remedying these. Secondly they have plans for meeting various kinds of disruption of services, for example the transport of coal to power stations and the supply of electricity to coal mines, the stocking up of essential consumers before an attack with supplies of fuel, etc., the provision of standby equipment at strategic points. Thirdly there are plans for the dispersal of stores of food, fuel and other necessities before an attack so as to give them the best chance of survival. Fourthly there are plans for transport and communications, including emergency service routes, emergency ports, a system of routeing telecommunications so as to avoid likely target areas and the maintenance of stocks of reserve equipment.

In industries and services which are not organised on a national basis some of these elements are not necessary; for example, in an industry which is not organised on a national basis the arrangements for liaison with regional government and local authorities are less necessary. But it does not follow of course that the functioning of a particular industry is less important because it is localised. It is not of course possible for people other than experts in particular industries to say with any precision what should be done to enable the industry to carry on or be re-started after a nuclear attack but I might mention some broad points.

First, we must recognise that the sort of attack we must expect under modern conditions, involving the extensive use of nuclear weapons, must cause widespread failures in gas and electricity supplies and that coal and oil supplies would be extensively disrupted at any rate for a time. For this reason, if for no other, most industrial activity would have to cease for a time, and re-starting it would obviously present complex problems.

The actual mechanics of closing may present technical problems in itself. In many industries such as iron and steel production, the plants cannot just be shut down; they either have to be kept running throughout attack or be subject to a controlled shut down over a period of time. If the plant were left to cool unattended it might be completely wrecked. I believe although as I said before, I am no expert, that similar considerations apply to, for example, aluminium smelting and chemical plants and nitrogen plants for fertilisers. Where such problems exist, there should clearly be plans for controlled shutdown or for reduction to the minimum level to prevent plant damage, and this is a matter which nationalised industries are considering.

Secondly, where some process must at all costs be maintained, the question arises for protection of workmen—shelter against fallout, living accommodation if public transport is no longer available, food and water for at any rate a few days. This maintenance of production is pre-eminently a problem for the power industries but other industries will have similar problems.

Thirdly, thought needs to be given to the question of re-construction after an attack. Production fields are now canalized to particular sources of supply, but the disruption caused by a nuclear attack would involve new sources of supply, and perhaps new substitutes. There would also, of course, be problems of how to get the finished product away. The sort of thing I have in mind I might illustrate from a discussion I recollect taking place during a 1965 study of the effects of an attack on various regions. The particular problem arising in the South Western Region of England was that through the loss of the usual outlets for liquid milk a substantial local surplus would have developed, and this would of course be tremendously valuable for the country as a whole if only it could be preserved. The West Country has canning factories which are capable for producing condensed milk but there are no manufacturing facilities for the cans themselves. Hence a regions problem which would be likely to arise there would be how to re-start supplies of cans which normally come from the midlands and of fuel for the canning plants which could be in the form of coal from South Wales. I do not wish to make too much of this particular example but it illustrates the sort of problem which one might expect to arise after attack, and although many of these have to be solved

in the light of the situation then preplanning might do quite a lot to reduce the difficulties.

Amongst other due functioning measures I might mention what has been done in the transport field and in relation to water supplies. The Ministry of Transport have quite extensive plans for emergency ports, including stock-piled equipment, and the Ministry of Agriculture have various mobile grain handling devices. To ensure the continuation of water supply where the normal supply is disrupted or contaminated, water undertakers have completed a survey of existing wells and bore holes, a programme has been completed to provide interconnection between water supply systems and a national stockpile of emergency water equipment is being maintained.

Essential Service Routes

We have also completely revised the arrangements for ensuring that essential service routes—that is the main trunk routes and the main roads in and around large cities—are kept clear for essential traffic in an emergency. These arrangements are being agreed with all interested Government Departments and Services and are of course part of their emergency plans.

Communications

Most of the matters I have just been speaking about are the responsibility of Departments other than the Home Office, and although the activities of the Home Office itself are of less direct interest to you, I should like to refer to a few of these.

In the communications field we are looking at the various systems of communications other than those provided by the Post Office. We in the Home Office have long had a direct concern with the provision of wireless for peacetime use in the police and fire services, and as you probably know, these systems are now very extensive. In addition, we have emergency Communications for the maintenance of Government in war and for the Warning and Monitoring Organisation, consisting partly of special telephone wires and increasingly of wireless links in the Very High Frequency and Ultra High Frequency bands. There are other systems used by various local authorities, services and the nationalised industries. The use of computors linked by special communications is also developing rapidly, in the light of these developments, we are examining what benefit we can derive in looking at the communications system as a whole, both for peacetime purposes and for maintenance of emergency communications in war.

Wartime doses of Radiation

A review has been going on for some time of the effects of gamma radiation on the human body in the light of more recent experimental findings both in this country and the United States. One of the more important recent findings of the Medical Research Council Radiobiological Unit at Harwell is that the animal body exhibits a two-stage recovery response to radiation. Firstly, a dormant reserve tolerance to an initial dose of about 150R given within about 36 hours; and secondly a tolerance by cell replacement equivalent to a recovery rate of at least 10R a day.

The extent of biological recovery from radiation damage (which appears to be greater than formerly supposed) and more favourable conclusions on the hazard from contaminated food and water are of some significance for civil defence planning.

The implications of these conclusions which are fundamental to much of other civil defence planning will have to be studied carefully, and we are considering how this may best be done. The main effect will be on the permissible War Emergency dose for civil defence workers engaged on life-saving tasks in the period immediately after attack and on public control plans, i.e. the control of the public under fallout conditions and shelter regimes.

We hope to complete assessment of the scientific elements in the early part of next year—by which I mean the modifications to be made in the definitions of public control zones, the release regimes within those zones, and the guidance to be given on exposure rules.

Later in 1970 we hope to hold a study at Easingwold to consider the organisational problems (control, water, food, health measures) of sustaining life in heavily contaminated areas (Z zones), with a view to revision of the Public Control Memorandum.

Communal fallout shelter

Dr. McAulay has already spoken to you about communal fallout shelter and has mentioned the 1966 Working Party of local and central government representatives to consider the range of problems connected with provision of shelter for people living in lightly constructed dwellings and also those caught away from home. The Working Party reported early in 1968 in favour of a survey, area by area, of available accommodation in existing buildings for such people. Such a survey would have involved calculation of protective factors by computing techniques and later the question of provisioning and other supplies. This would have cost an appreciable sum of money, and is therefore clearly out of the question in the present circumstances.

We are however making a start with the preparation of draft guidance to local authorities on the criteria for the assessment of protective factors for communal shelter, the timing of movement to shelter, the scale of provisioning for communal shelter, and the question of shelter leaders. When this has been completed the local authority Associations will be consulted on the text and the timing of its issue to local authorities.

Assessment of casualties

In assessing the comparative effectiveness of various civil defence measures, fundamental calculations have

to be made about the immediate effects of heat, blast and radio-active fallout stemming from the use of thermo-nuclear weapons. In the past this has been carried out laboriously by manual methods and it has been possible only to make such an assessment at infrequent intervals and against one set of attack assumptions. We are currently devising programmes to enable us to use computor techniques for this purpose. This should enable us to acquire rapidly and against any set of attack assumptions we care to feed in much of the information which is fundamental to an assessment of the most effective civil defence measures to pursue.

N.A.T.O.

We are keeping closely touch with our allies in Western Europe in civil defence planning, and we compare notes in N.A.T.O. at regular intervals. I attended two N.A.T.O. meetings this year, and Mr. Howard from the Home Office will be attending another meeting in Brussels next week.

Some play has been made from time to time of the levels of civil defence activity in different N.A.T.O. countries, the usual implication being that we are falling badly behind. It is certainly true that the present West German expenditure for example, running at a higher level than that in the U.K. However there are substantial variations and certainly our Allies have not criticised us on the score that we are lagging behind generally. For example, our Warning and Monitoring system is almost certainly still the best, and in other respects, e.g. the arrangements for government in war, we are at least as far forward as the others.

The most conspicuous reduction in our civil defence preparations over the last year or so has been the disbandment of the Civil Defence Corps and the Auxiliary Fire Service; but since several NATO countries, including the United States and Italy, have not and never have had forces corresponding to these bodies, such a disbandment does not put us generally out of line. Of course some countries do more in one particular direction, and others less—for example the United States are the acknowledged leaders in fallout shelter; Western Germany probably now has numerically the largest volunteer firefighting forces—and we lead in warning and monitoring. But it would be wrong to say we are now out of step in civil defence generally.

Local Authority planning Civil Defence Circular No. 2/1969

We are also continuing to consult local authorities on the development of their emergency plans. A start with more constructive planning within local authorities was made by the issue of CDO 2/1969 to local authorities in March of this year. The aim in issuing this was to dispel, as far as possible, the mistaken impression that civil defence is dead. We indicated that central government planning is continuing and that local authorities still have specific statutory responsibilities.

During the last two weeks four conferences of all local authority civil defence officers in England and Wales and Scotland have been held at Easingwold to discuss and progress local authority war planning Regional meetings of local authority civil defence officers, attended by a representative from the Home Office, have been held in most regions during the year with the object of advancing local authority war planning. Although progress throughout the country is patchy the results of concentrating on planning, as distinct from training, is encouraging.

Conclusion

Although the tempo of civil defence planning and the developments of operational policy will inevitably be at a lower tempo than previously it should be clear from the brief outline of activities which I have mentioned that civil defence has not been abandoned. The kind of planning measures I have outlined which are going ahead attract very little publicity, but they are none-the-less important and we in the Home Office and in other Government Departments and services will ensure that it goes ahead as fast as possible within the financial limits we have been set.▲

LIFE IN SHELTERS – A SWEDISH TEST

For the first time, a very realistic occupation trial was carried out in a normal shelter in Sweden. The following conditions were the basis of the trial:

(1) Those seeking shelter were instructed to solve all problems which arose by themselves;
(2) the majority of the participants knew hardly anything before the trial about shelters, how they function, how many persons they can accommodate, etc.;
(3) the normal shelter was equipped according to the requirements in force—neither better nor worse;
(4) the maximum number of occupants authorized was crowded in the shelter;
(5) persons of both sexes and of all age groups took part in the trial.

Aim of the test — Testing the shelter manual

The persons seeking shelter merely received brief instructions before the trial. An "air-raid" alarm was given and they had to make use of the shelter in the best way possible. A copy of the shelter manual was hung up in the shelter. This could be consulted whenever necessary.

The main aim of the experiment was to test the shelter manual which is almost ready for publication. The manual will contain all the necessary information about shelters: the extent of protection, what must be taken to the shelter when an air-raid alarm is given, how to face the situation, etc.

The problem of space

Just after 6 p.m. on 21st January, 1969, 54 persons were "squashed" into the shelter; 36 men and 18 women, who had undergone a medical examination beforehand, including the ECG. The first impression was that there was too little space available for those seeking shelter. The free floor area was 43 m^2 and 54 persons had to be accommodated on this, which meant that each person had 0.75 m^2 of space, which is the amount available with maximum occupation.

Ventilation

Air is provided by a manually-operated ventilator which is worked by two persons. Putting the ventilator into operation immediately after occupation is of decisive importance. The shelter is hermetically closed off to protect it against gases and other chemical warfare agents. The air drawn in is cleaned by a filter. If the air is not renewed, its proportion of carbon dioxide increases very quickly, while oxygen is used up at the same time. In addition, the temperature rises.

After 20 minutes had passed and the ventilator still had not been put to work, the trial organizers became anxious. The room's temperature rose and they considered how long they should wait before taking action. After 30 minutes, however, one person thought of operating the ventilation, and the organizers could breathe with relief.

A leader comes forward

In four different places in the room, the following instructions had been posted: Close doors and windows —Sit or lie down—Read the shelter manual—Choose a shelter leader—Work the ventilator, but only according to the instructions for use.

The trial organizers thought that these above instructions would help the occupants carry out their tasks. The notices, however, proved to be too small and therefore attention was hardly paid to them.

Co-ordinated action did not take place at first. Then, after about half an hour, a man stood up and took over the leadership. Using the manual, he laid down the tasks for each individual occupant of the shelter. Each person had to work the ventilator for ten minutes; one had to take charge of the toilets, etc.

Team-spirit during the stay in the shelter

Each person gradually settled down in the space available to him. Almost without exception, each kept the place which he had chosen at the beginning. There were only 37 mattresses, but these were sufficient. They covered the whole floor so that it became a single bed. Everyone took off their shoes and walked with socks, so that the mattresses remained more or less clean.

Foodstuffs — an important part of the test

In a normal shelter there are no means of preparing food. An open fire, for instance, a paraffin cooker, may not be used because it uses up oxygen. Other methods of cooking, such as electric hotplates, give off unwelcome warmth in the shelter. The occupants therefore had to take in with them foodstuffs which can be eaten without being warmed.

Before the trial, each person gave in a list of various ready-prepared meals, tinned foods, bread, cold meat, etc. These were foodstuffs which are stocked in the home for crisis situations. The goods on the lists were bought for each person and packed in bags which were distributed at the beginning of the trial. Tinned fruit of all kinds was the most popular food. Among the ready-prepared meals, beef with potatoes, and chicken and rice were the most sought after. Sliced cheese was in great demand.

(continued on page 18) **LIFE IN**

IN THE SHADOW OF GROUND ZERO

by
Wm. Cornelius Hall and Carsten M. Haaland

Is survival within the heavy blast area of a nuclear weapon possible? The picture usually given is one of hopelessness. Here two scientists, specialists in the nuclear field, show that measures to contend with this brutal environment are practical and if conscientiously implemented will result in survival odds worth fighting for.

The Soviet Union has over a thousand missiles[1] and several hundred aircraft which can deliver nuclear weapons to the U.S. In a few years China will also be able to deliver them. The development of the ultra-centrifuge for enriching uranium and the possibility of a laser trigger for thermonuclear weapons[2] may make nuclear weapons available to the secondary nations of the world in 10 to 20 years. If a general war should break out, chances are very great that these nuclear arsenals will be used, and that many nuclear weapons will be used in an attempt to destroy our cities.

Nuclear war is horrible to contemplate, but it *is* possible to reduce the fatalities and injuries—even within target areas—by as much as tenfold and to ensure the recovery of the nation afterwards by implementing basic civil defense measures.

The Destructive Effects of Nuclear Weapons

A nuclear weapon is so devastating because it releases an enormous quantity of energy into a small volume in a very short time. A nuclear weapon rated at a yield of one megaton occupies less space than an automobile, yet it releases upon detonation the same amount of energy as one million *tons* of TNT (enough to fill 100 freight *trains*, each train with 100 *gondolas*, and each gondola carrying 100 *tons* of TNT). Both the U.S. and USSR have now the capability of delivering this tremendous quantity of energy *or more* in any *one* of their strategic missiles. Furthermore this energy can be delivered over a range of 5000 to 7000 miles in 25 to 35 minutes.

The sudden release of the energy of a one megaton nuclear weapon begins the sequence of events listed below (for more technical details the reader is advised to read *The Effects of Nuclear Weapons*)[3]:

Prompt nuclear radiation: At a distance of one mile, a person would need the protection of about one foot of steel, four feet of concrete or five feet of earth in order to suffer no ill effects. At this range he would also require protection by a specially designed structure rated to withstand an over-pressure of about 60 pounds per square inch.

Flash: On a fairly clear day, thermal radiation would be of sufficient intensity to cause moderately severe burns of exposed skin as far away as twelve miles. The warmth may be felt at a distance of 75 miles. Newspapers would be ignited at a distance of about nine miles. Heavy dark cotton draperies would be ignited through living room windows at a distance of about six miles, and various items of exterior clothing in dark colors would be ignited at five to six miles.

Shock Wave: At a distance of four to five miles, wood frame houses would be torn apart and the frames shattered by the shock and blast. At three to four miles, multistory brick apartment houses would be shattered.

Blast Wind: At a distance of four miles the peak velocity in the gust of wind which follows the shock wave would be 180 mph. A man standing up would be hurled through the air about fifteen or twenty feet. Slivers of glass from shattered windows would fly through the air with speeds of 100 to 130 mph.

Fallout: The harmful effects of fallout from an *airburst* would be virtually negligible. However, a *surface burst* fireball picks up thousands of tons of dirt and debris and the radioactive materials from the bomb attach to it. When this debris settles to earth again, it is radioactive. In this case, several hun red square miles would be contaminated to the extent that people remaining in the area without taking shelter would die of radiation sickness. Fig. 1 (opposite) shows a possible fallout pattern resulting from an attack of 3600 megatons on the U.S., of which 1600 megatons is directed at cities. About half the people remaining for the first four days in the 300 to 1000—total—roentgens areas without protection would die, and all those remaining for the first four days in the areas of 1000 total roentgens or greater without protection would die.

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[1] C. M. Haaland, "*U.S., vs Soviet Union Strategic Offensive Force*," in Survive, Jan-Feb 1969.

[2] Neville Brown, "*Blows to Non-proliferation*," in New Scientist, Feb. 6 1969, p. 295.

[3] *The Effect of Nuclear Weapons*, prepared by the U.S. Dept. of Defense, edited by Samuel Glasstone, is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., for the price of $3.00 and can be obtained by mail, postfree. It consists of 730 pages and includes a Nuclear Bomb Effects Computer, a circular plastic "slide rule" for making rapid calculations of bomb effects.

Practical measures for protection against nuclear weapons effects—including blast and heat—are well established. Two hypothetical and extreme cases are:

1. The highest degree of protection is available, and people are warned in advance so they can use it.
2. No pre-planned protection is available, and people are caught in the streets without warning.

Hardened Shelters Can Provide Almost Complete Protection

Prompt nuclear radiation is reduced in intensity by passage through matter. At a distance of only 1500 feet from the origin of a one megaton nuclear detonation, a person would be perfectly safe from the prompt nuclear radiation if he were surrounded by a wall of earth of about 10 feet thickness, or of concrete of about seven feet thickness. The overpressure in the shock wave at this close range would be about 1000 pounds per square inch.

This shock wave would be transmitted through the ground to a buried structure with its top several feet underground. Even if the structure were sufficiently strong not to crack under the impact of this shock, the entire structure and the soil around it would be suddenly knocked back and forth several feet by the action of the shock wave. People inside would be injured or killed by being thrown about unless the structure were designed and built to isolate the inhabitants from the effects of the shock wave.

Shock isolation can be accomplished by building the structure in two shells, one inside the other, with springs separating the shells. The outer shell is designed to shield from prompt nuclear radiation, and is sufficiently strong to withstand the impact of the shock wave and ensuing motion. When the outer shell is suddenly displaced, the inner shell initially remains virtually fixed in place by compressing the mounting springs on one side and expanding them on another. Shelters of this type actually exist.

It is not practical to build protective structures which will protect people at higher overpressures than 1000 pounds per square inch, because the region where these higher overpressures occur is within or too close to the crater formed by the explosion. However, shelters protecting against lower pressures are feasible.[4]

Protection against prompt nuclear radiation and blast in the high pressure region is also protection against the effects of thermal radiation, blast wind, and delayed nuclear radiation. Heavy fallout may cause lethal radiation in the first few hours after the detonation, but the radioactivity would decay to a level that would permit the safe evacuation of people by automobile after two days (the streets would have to be cleared by bulldozers having special shielding to protect their crews against the radioactivity). In two weeks one could walk in the area for several hours without protection and without any harmful effects, i.e. without bringing on radiation sickness.

The area of heaviest fallout would be suitable for habitation in about two years. Rainfall would shorten this period, but monitoring the initially heavily contaminated areas in order to assess the residual radioactivity would remain almost imperative in any case.

So, almost complete protection *can* be provided by a special and very costly structure very close to the nuclear inferno. The task is much simpler farther away from the explosion.

Survival Without Protective Structures

At a distance of two miles or more from a surface burst of one megaton yield it is even possible, with luck and alacrity, to survive *without* the benefit of a special structure.

Suppose *you* are walking on the street of a city and suddenly, noiselessly, the air is filled with stark, dazzling light. Looking directly toward its source would instantly cause permanent blindness. Even the reflected light can cause temporary flash blindness which may last from a few seconds to several days. Duck *immediately* into the shadow of something, anything—a car, a building, or even a utility pole. Cover your face and as much exposed skin as possible with your clothing to prevent serious burns. If you are close enough to the detonation to receive a lethal dose of prompt radiation, you are likely to be killed by the all-shattering blast wave anyway. At two miles distance you have a chance. The blast wave arrives in 5 seconds.

Here the greatest hazard from the blast will be from falling walls, flying bricks and glass, and also from the possibility of being picked up (if you are standing in the open) by the wind and mixed with flying debris. The inside of a culvert or of a storm drain offers good protection and a deep ditch is fairly good. A deep gutter by the sidewalk is better than the sidewalk itself or the middle of the street. Wherever you are, get down on your stomach and hug the ground. An automobile (not convertible) will provide fair protection if you get down on its floor. Stay away from windowpanes. If you are inside a building, get under a solid table, desk or bed, preferably near the sturdiest wall, and away from glass. Cover yourself with layers of blankets or cloth or any kind of padding, if available.

> *Suppose you were not concerned with survival, and were on a high hill from which you could see the city extending below you, you would see a bulging, rolling line of buildings being smashed followed by a wall of dust and debris rapidly advancing towards you. You would hear no sound because the shock wave would be moving towards you faster than the speed of sound, faster than 1100 feet per second.*

The sudden increase in pressure from the shock wave may pop your eardrums, knock your breath out, and give you a nosebleed and sore lungs even though you have protected yourself from missiles and falling

[4] See "*Blast Shelter Effectiveness and Cost*", by Eugene P. Wigner, Page 12.

walls. Furthermore, the blast wind, which will drive air and dust with a peak gust velocity of 240 mph and a temperature of around 150°F, can produce severe burns on exposed flesh. The situation is, of course, better farther from the explosion.

Assuming you still are in business, you now have two more hazards to face: fire and fallout.

The flash which initiated the chain of events will have ignited many flash fires throughout the city. Many of these will be blown out by the blast wind, but those which are not may now burn faster because of the piling up of rubble. Additional fires might start due to shorted power lines and broken gas lines. The important thing is this: the fires must be conquered within ten to fifteen minutes after the blast wave has passed. Otherwise they may grow beyond control. The area covered by flash fires will probably be too large to get out of.

If there are only a few people fighting many (initially small) fires, there may be little chance for controlling them. However, if there are enough people fighting them, say one or two for each unit of area equivalent to that of an ordinary house, there is a very good chance of extinguishing them.

Last: Fallout Radiation

The final and most uncertain hazard of the nuclear detonation (assuming it was a surface burst) is fallout. If the fireball did not touch the ground, there will be no danger from fallout. But unless the burst was very high up, it would not be easy to determine from the flash whether the burst was an air burst or a ground burst.

After the major part of the light flash is over, even a sneak look at the fireball would still severely damage your eyes, and probably would not confirm it as either a surface or an air burst. The fireball will be rising at the rate of several hundred feet per second. But if large chunks of pavement, bricks, or rocks fall out of the sky while you are out fighting fires, you may be certain that the detonation was a surface burst, and you will know you must be concerned about radioactivity.

Also, while you are fighting fires, you may notice that the shadows of some objects, such as a fire hydrant, have been lightly sketched onto pavement or concrete, or outlined on grass by the heat of the flash. If the length of this shadow is less than twice the height of the object, then you are free of the direct hazards of this nuclear detonation. Fallout will not be a hazard to you.

If you cannot determine whether the detonation was a surface burst or an air burst, or if you learn that it *was* a surface burst, then you must find or prepare protection against radioactive fallout as soon as possible.

In an area where nearly all buildings are shattered and strewn about, look first, without spending too much time, for a building which may have had food stored in it. If you see an official "Fallout Shelter" marking, go to that location. Even though the building may be severely damaged, the food and water stocks in it are planned for use through the fallout hazard. Look for a basement area where the beams form a lean-to, i.e., the ends of the beams on one end are propped up on the top of the basement wall. You may have to improvise. Construct a lean-to, if you can't find one. Don't choose a low area where rain might wash radioactive debris into your shelter. Watch out for leaking gas lines and fallen power lines. If you have time, quickly pile additional beams on top of your lean-to, then pile layers of loose bricks and chunks of concrete on top of these beams, as thick as you can, and fill in the voids between the chunks with loose dirt. If you are able to get about 12-18 inches cover over the beams, your shelter may reduce the effects of fallout by a factor of 100 or more, and you can survive this final hazard. However, you may have no more than a half hour's time.

The hazards we have described would be less severe at greater distances from the nuclear detonation. At greater distances, more time can also be spent on the preparation of an emergency fallout shelter.

Without good shelter achieved through prior planning, in order to survive in a target area you will need lots of luck, and lots of organized emergency know-how.▲

LIFE IN *(continued from page 15)*

Close observance and supervision of what happened

The reactions of the persons in the shelter were observed and noted. Through two half-transparent mirrors, a physician and two psychologists supervised the room, and continually wrote reports. The room temperature as well as the carbon dioxide proportion and the humidity were registered by members of the Swedish Defence Research Institute. Electric sondes were hung up in the room. The pulses were transmitted to recorders which automatically kept the atmosphere conditions stable. The state of health of the persons undergoing the trial was checked by measuring their temperature every four hours. All those in the shelter were in the best of health; only one person had fever and had to stop the trial.

On Sunday, 23rd January, the trial was stopped, after having lasted exactly two days.

Trial with a good result

As already mentioned, the aim of the trial was to test the shelter manual. This is now to be altered on the basis of the newly acquired knowledge. The central Swedish Civil Defence Department hopes to be able to publish a first edition of the manual during the second half of the year. ▲

EMERGENCY MANAGEMENT IN OKLAHOMA CITY

by
*John Causten Currey**

Reprinted from Survive, January-February 1970.

City Manager Robert Oldland of Oklahama City is a firm believer in emergency plans. The fact that he was city manager of Anchorage when the disastrous Alaskan earthquake struck that city is undoubtedly a factor in his determination to be prepared for any sort of calamity.

When he came to Oklahoma City in 1967, Bob Oldland found an organization and a man to match his enthusiasm for this approach. The city's Director of Safety and Civil Defense, Leroy B. Hansen, has served in that post since 1959.

Hansen's operations are based in a municipal emergency operations center which is located in a blast-protected underground building. This EOC is manned 24 hours a day.

Both Oldland and Hansen argue persuasively that local governments can and will support sound civil defense programs if they are combined with other essential services.

"I do not suggest that we could get along without the plans and tools with which to meet a war or nuclear emergency," Oldland says. "But the standard concept of civil defense is outmoded. The name itself is misleading; it no longer represents the full range of services which an effective and adequate emergency system provides."

Planning Covers all Types of Emergencies

Hansen agrees. "Both local and national governments should recognize the need for a single program to plan for, respond to, and recover from emergencies of all types," he says.

Oklahoma City lies at the south edge of the area of greatest tornado frequency in the United States. Some 200 of these violent storms occur each year in north and central Oklahoma. In earlier times, casualties from twisters were often heavy. With modern warning systems, deaths are rate. In the 5-year period 1962-1966, only one death occurred in the state. In 1967, 4 members of one rural family were killed when they waited too long to seek shelter. Oklahoma City itself has a remarkable safety record for the past decade.

Part of the reason is the civil defense warning system. The city's 19 siren towers, and two suburban sirens, are controlled from the EOC .They can be sounded individually, in any selected combination, or all at once.

Emergency plans also cover flash floods, local area flooding, power failure, civil disorder, major fire, and a number of other possible calamities.

Salesmanship a Necessity

Hansen works steadily at the public relations side of his job. In addition to encouraging visits to the EOC, he is a frequent speaker at civic functions, explaining various phases of his work. He sees the integration of civil defense into the day-to-day pattern of city operations as the basic reason for the remarkable public support for his department.

"Before we had today's facilities and coordination, we had to be sold on the idea," says a former city councilman. "Hansen is a great salesman. He has vision and yet is a completely practical man. He convinced the mayor, the manager, and the council. If he had not been so persuasive, that 1962 bond issue for an emergency operations building would never have been on the ballot. It is probably the best single investment in a management tool the city ever made."

The emergency operations center was approved by one of the largest margins in any bond election in Oklahoma City's history. By the time it was completed, it represented an investment of about $650,000 exclusive of land. At present, it is estimated that another $100,000 has been spent on additional equipment.

The city emergency operations building stands apart from other structures, easily accessible from two interstate expressways and several main avenues. It is entered through a dogleg corridor and a single blast door. The core-and-perimeter floor plan cover 11,700 square feet. The building is designed to withstand a blast overpressure of 30 pounds per square inch, and the fallout protection factor is "something over 10,000."

State Also Digs In

The state legislature had already approved an underground building to house "the emergency seat of state government in Oklahoma" before the city voted on its own EOC. Completed about the time the city building was begun, the state building covers about 18,000 square feet in a blast-protected structure which is, like the city EOC, in daily use. A long underground corridor between the Sequoyah and Will Rogers state office buildings would serve as dormitory areas in emergency. The 370-foot section between the two 19,000-pound blast doors is lined with travertine marble, and connects at the east, outside the blast doors, with two other

* John Causten Currey—columnist, political analyst, and top-drawer intelligence expert—counts among his many awards three Freedom Foundation's George Washington Medals.

underground buildings. A cafeteria seats 400, and across the way there is a 375-seat auditorium. Both, of course, are excellent fallout shelters.

The state emergency center building contain offices of the state civil defense agency, an emergency communication center, and a data processing center with a high-performance RCA Spectra 70/35 computer. In this building, which represents a total investment of $1,000,000, all lighting and plumbing fixtures and such accessories as clocks and fire extinguishers are shock-mounted. There is an emergency power supply, a 600-feet-deep water well, and a silo-based retractable communication antenna which can be extended 123 feet above the mall in three minutes, including the time it takes to open the silo hatch. The cover can open even if buried under tons of debris.

Both buildings are cheerful, well-lighted, and attractive places to work, featuring filtered constant-temperature air systems. Recent redecoration of the director's suite in the state building (which would become the Governor's suite in an mergency) puts it on a par with executive offices in the newest skyscrapers. Royal blue carpets, walls covered with grasscloth walnut or cork paneling, or in bright sun-gold, and large planters remove the last vestiges of the "besement" aura of many subsurface buildings.

Oklahoma City's preparation for emergencies would not be the same without such physical plant investments. Yet the physical facilities are more a reflection of official and public acceptance of emergency preparedness than a reason for it. And that is the point most often made by responsible officials in Oklahoma City.

OTHER NATIONS PREPARE TOO

The New York Times reported that "The possibility of world-wide nuclear war was a dominant theme of a New Year editorial appearing in Peking publications.

"The editorial, quoting the Chinese Communist party chairman, Mao Tse-tung, called on the people of the world to make immediate preparations against such a war . . .

"Throughout 1969 Peking made war preparedness a major task for the Chinese people. Newspaper articles implied that the Soviet Union and the United States separately or together were potential aggressors threatening China . . .

"The possibility that the Soviet Union might attack China was a particular preoccupation of the Chinese in 1969," the Times said.

A number of news reports from China in the previous two months say that the Chinese are intensifying civil defense efforts and "digging" shelters against the threat of a Soviet nuclear attack.

Most recently, the Christian Science Monitor reported:

"All over Communist China underground air-raid shelters are being built. And all over China people, even the youngest schoolchildren, are being taught and drilled in what to do in the event of nuclear attack. This includes detailed instructions in how to decontaminate oneself after exposure to nuclear fallout."

The German Federal Government has issued directives for Federal Grants as an incentive to shelter construction in residential buildings. Eligible shelters would protect against falling debris, radioactive fallout, and the effects of biological and chemical weapons. Only those shelters started in apartment buildings and homes after June 30, 1969 are eligible for grants, ranging from $50-$60 per shelter space. Shelters constructed outside of apartment buildings must be made available to anyone in the immediate vicinity in an emergency. Federal budgeting for this program and all personal shelter construction is shown as follows in millions of dollars:

> Residential shelters—1969: 0, 1970: 2.8, 1971: 5.7, 1972: 7.1 Total personal shelters—1969: 11.0, 1970: 14.1, 1971: 17.0, 1972: 18.7

The other shelter construction authorized is in hospitals, multi-purpose buildings and for restoration of World War II shelters.

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